

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

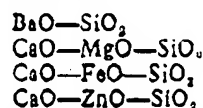
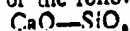
### Glasses for the Manufacture of Superfine Fibres

WE, ACTIEN-GESELLSCHAFT DER GERRES-  
HEIMER GLASHÜTTENWERKE VORM. FRD.  
HEYB, a German Company, of Düsseldorf-  
Gerresheim, Germany, do hereby declare the  
invention, for which we pray that a patent  
may be granted to us, and the method by  
which it is to be performed, to be particularly  
described in and by the following state-  
ment:—

- Mineral fibres of great or infinite length  
with a diameter of more than  $5\mu$ , can be  
manufactured according to the known Owens  
blowing process by allowing the blowing jet  
to act at high velocity on the streams of the  
molten mass coming from the nozzles of the  
container for the molten material in the direc-  
tion of their flow, and drawing the streams  
to a smaller diameter. On the other hand very  
fine fibres, namely with a diameter of less than  
 $5\mu$ , have been produced according to the  
known mineral wool blowing process (slag  
wool, rock wool). This cannot be achieved by  
the action of drawing alone. Rather it is  
necessary when blowing for there to be a tear-  
ing and dividing up of the streams of material.  
The resulting fine fibres are short and have  
an appearance similar to wadding. One diffi-  
culty, however, is that the product contains a  
large proportion of coarse drops, which may  
reach up to 50% by weight.

- By improving the blowing technique of this  
process attempts have been made to improve  
the quality of these fine mineral wools and  
particularly to reduce the proportion of coarse  
drops without, however, any satisfactory  
result having been achieved.

- It has now been found that it is possible to  
produce a very fine fibre with a diameter be-  
low  $5\mu$  by the known blowing or centrifugal  
process of disintegrating the stream of molten  
material and to avoid the occurrence of coarse  
drops, by using, for the manufacture of these  
fibres, glasses of silica binary or ternary sys-  
tems which contain practically no alumina,  
e.g. glasses of the following systems:



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The melts of such systems are very similar  
to salt melts. Their principal characteristic is  
high surface tension in conjunction with very  
low viscosity which is maintained almost  
directly until devitrification, when it then  
increases rapidly. Owing to these properties,  
the melt, on being blown is first reduced to  
a multiplicity of very small drops (like  
mercury) which are then drawn out into very  
fine fibres. The drops still contained in the  
wool are so small that they can scarcely be  
perceived with the naked eye. The melts of  
the binary and ternary systems also have the  
advantage in the blowing process that they  
lead to higher capacity because, in conse-  
quence of its lower viscosity, the melt flows  
out more easily and rapidly through the  
nozzles of the container for the molten  
material.

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Mineral fibres known up to now all contain  
considerable quantities of alumina, or they  
contain in addition to the usual constituents  
other common additions which cause the  
viscosity to rise steadily over a fairly long  
range, for example a range of 500°, up to the  
setting point. The generally lower surface  
tension of these melts cannot remain effective  
sufficiently long, owing to the more rapid rise  
in the viscosity, so that only a coarse disin-  
tegration of the melt is achieved.

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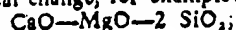
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Previously it has not been thought possible  
to dispense with the use of alumina in the  
manufacture of mineral fibres in order to ob-  
tain strong, i.e. weather-resistant, fibres. It has  
now been shown, however, that at least equal,  
if not better, chemical and physical properties  
of the end product can be achieved if the  
composition of the melt is so selected as to ob-  
tain a congruent melting chemical compound  
which at the same time does not suffer from  
any chemical change, for example:

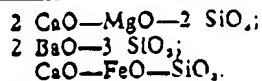
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[Price 3s. 6d.]

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(Melting is "congruent" when the chemical composition of the solid phase is identical with the composition of the liquid phase throughout melting.)

Mineral wools of such chemical compounds show, in consequence of their stronger molecular bond, a considerably better chemical resistance than wools of simple silicate mixtures so that one can omit the usual addition of alumina.

Polymorphous compounds should be avoided because when higher temperatures act on the mineral wools disintegration may occur by crystal conversion, a process which has frequently been observed in mineral wools known up to now.

What we claim is:—

1. Glasses, for the manufacture of very fine mineral fibres by disintegration of the melt in blowing or centrifugal processes, consisting of chemical compounds of silica binary or silica

ternary systems, substantially free from alumina, which melt congruently and are unchanged in conversion from the solid to the liquid phase.

2. Glasses according to claim 1 wherein the system is  $\text{CaO—SiO}_2$ .

3. Glasses according to claim 1 wherein the system is  $\text{BaO—SiO}_2$ .

4. Glasses according to claim 1 wherein the system is  $\text{CaO—MgO—SiO}_2$ .

5. Glasses according to claim 1 wherein the system is  $\text{CaO—FeO—SiO}_2$ .

6. Glasses according to claim 1 wherein the system is  $\text{CaO—ZnO—SiO}_2$ .

7. A process for the manufacture of very fine mineral fibres, wherein a melt of a glass according to any one of the preceding claims is blown and first reduced to very small drops which are then drawn out to form the very fine fibres.

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